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DESCRIPTION OF A NEW PELECYPOD OF THE GENUS *LIMA* FROM DEEP WATER OFF CENTRAL CALIFORNIA

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Dredgings secured during off shore work on the U. S. *Mulberry* during 1950 on U. S. Naval Research Project Number N9 onr 94400, yielded marine mollusks from many stations. Most of the species dredged in waters less than 100 fathoms deep are known from other localities, but in several instances their occurrence off central California added to the known range of the species.

Biologic material from deep water is of more than usual interest. It is scarce in collections because of the difficulty of recovering mollusks and similar organisms at great depths. Some of the genera of mollusks represented in the present collections from deep water are *Solemya*, a pelecypod, and *Cocculina*, a gastropod. The widespread occurrence of deep water species, or groups of extremely similar forms, over vast areas of the ocean bottom aids studies concerning the past and present distribution of marine faunas.

Specimens of a bivalve mollusk, *Lima*, dredged off San Mateo County in 690–800 fathoms are therefore of special interest. Species belonging to the same subgenus have been found occurring as fossils in California, Oregon, and Washington, but living species have been known along the western Americas from off southern Chile, Panama, and the Galapagos Islands. Heretofore the only known living representatives in the north Pacific were two

occurring off Japan. To this group a new species, *Lima mori*, is now added from off central California.

Class **Pelecypoda**

Family **Limidae**

Genus **Lima** Cuvier

Lima Cuvier, Tableau Elém., 1798, p. 421. Sole species, *Lima alba* Cuvier [=*Ostrea lima* Linnaeus, Syst. Nat., ed. 10, 1758, p. 699. "Habitat in O. meridionali." Ref. to "Argenv. conch. t. 27. f. E."].

The family Limidae has been recorded as occurring in Carboniferous and Permian rocks. Typical forms of the genus *Lima* are known to occur from lower Cretaceous to Recent. At the present time the genus is found at various depths in all oceans. The species can move about by crawling or swimming and some of them build nests. The family is represented in marine waters along the west coast of North and Central America by eight or ten species.

Subgenus **Acesta** H. & A. Adams

Acesta H. & A. Adams, Gen. Rec. Moll., vol. 2, 1858, p. 558. Sole species, "*excavata*, Chem." [Chemnitz, Syst. Conch.-Cab. von Martini und Chemnitz, Bd. 7, 1784, pp. 267 *(Concha excavata)*, 355 *(Excavata Fabricii* and *Ostrea excavata)*, pl. 68, fig. 654. "an den norwegischen Stranden."=*Ostrea excavata* Fabricius.]

The shells of the members of *Acesta* are usually large, comparatively thin, sometimes somewhat ventricose, and sculptured with radial ribs which are coarser on the anterior and posterior margins and fine or nearly obsolete on the medial portions of the valves. The ligamental pit is oblique. The shell is similar to that of *Plagiostoma* J. Sowerby which was represented by numerous species during the Mesozoic era. *Acesta* differs from Sowerby's subgenus in the less oblique form, generally shorter anterior umbonal ridge, and the shallower ligamental pit. *Pseudacesta* Waagen has as its type *Mysidoptera (Pseudacesta) dieneri* Waagen, a species from the upper Triassic of Austria. Thiele and Woodring have indicated that there is but little difference between *Acesta* and *Callolima* Bartsch which was based upon *Lima (Callolima) rathbuni* Bartsch, a species occurring in Philippine waters. Oyama (1943) and Habe (1951) recently placed *Callolima* in the synonymy of *Acesta*.

Species referable to *Acesta* have been described from strata in western North America which have been referred to the Oligocene and the Pliocene. The subgenus has been recorded elsewhere as occurring throughout the Tertiary and perhaps in the late Cretaceous. At the present time some species occur in moderately deep water (150 fathoms) but most of them occur at greater depths down to 2,000 meters. Lamy (1930) has cited the Recent species.

Lima (Acesta) mori Hertlein, new species

Plate 20, figures 12 and 13

Shell ovate in outline, inequilateral, rather inflated, thin, moderately large, white, the exterior stained light brown along the anterior and posterior margins; hinge line short, straight, with a small, narrow, oblique ligamental pit; beaks eroded, situated near anterior end of hinge line; an elongate, excavated lunular area below beaks, the surface finely radially ribbed; anterior slope oblique; posteriorly, the margin rounds into the hinge with very short slope or none at all; exterior sculptured with numerous radial ribs which are very fine along the medial portion of the valve, nearly obsolete on the umbo but becoming coarser toward the margins, especially anteriorly, about 12–13 per centimeter along the posterior ventral margin; concentric sculpture, very fine, imparting a wavy character to the ribs; interior white, polished, the margin faintly crenated or completely smooth; muscle impression rather small, high, posterior; a small projection due to the upturned shell margin is present at the anterior end of the hinge. Dimensions (ventral margin incomplete); height, 61.8 mm.; length, 55 mm.; convexity (one valve), 15.8 mm.; length of hinge, 15.5 mm.; length of anterior umbonal ridge, 23 mm.

Holotype, right valve, No. 9524, Calif. Acad. Sci. Dept. Paleo. Type coll., from Loc. 33027 (C. A. S.), U. S. *Mulberry* Station 38, Lat. 37°26.5′ N., Long. 123°28.7′ W., **Mulberry Seamount,** in 690 to 800 fathoms, rock, shells. A portion of a left valve present in the same dredge haul apparently represents the opposite valve of the type specimen.

The general shape of the species here described as new is similar to that of *Lima (Acesta) diomedae* Dall[1] (1908, p. 407, pl. 7, fig. 2), described from near the Galapagos Islands in 385 fathoms. It differs from that species in the much finer radial ribbing and thinner shell. *Lima (Acesta) agassizii* Dall[2] (1902, p. 16) and (1908, p. 407, pl. 16, fig. 1), described from the Gulf of Panama in 322 fathoms, and the similar *Lima (Acesta) hamlini* Dall (Woodring, 1938, p. 47, pl. 8, figs. 5, 7, 10, 11), from the Pliocene of Los Angeles basin, are higher in proportion to the length than either *L. mori,* n. sp. or *L. diomedae.* Other fossil forms bearing a general resemblance to *L. hamlini* were described as *Lima (Plagiostoma) oregonensis* Clark[3] (1925, p. 84, pl. 14, figs. 3 and 4), from the Oligocene of Oregon, and *Lima robertsae*

1. "U. S. S. *Albatross,* station 3404, near the Galapagos Islands, in 385 fathoms, rocky bottom, temperature 43.2° F. U.S.N. Mus. 122,875."

2. "From the Gulf of Panama in 322 fathoms."

3. "Occurrence—U. C. loc. 4118. Railroad tunnel about ten miles out of town of Buxton toward Tillamook, Oregon."

Durham[4] (1944, p. 139, pl. 13, fig. 10), and *Lima twinensis* Durham[5] (1944, p. 139, pl. 13, fig. 11), from beds referred to the Oligocene in Washington. *Lima (Acesta) patagonica* Dall (1902, p. 16[6], and 1908, p. 407[7]), described from off southern Chile in 245–481 fathoms, was compared to *Lima (Acesta) goliath* Sowerby (1883, p. 30, pl. 7, fig. 3)[8], from Japan and *Lima (Acesta) excavata* Fabricius (Sars, 1878, p. 24, pl. 3, figs. 1a–d; Friele & Grieg, 1901, p. 6; and Lamy, 1930, p. 187), from northern Europe.

Lima (Acesta) mori, n. sp., appears to be quite different from any of the giant limas described by Bartsch (1913, pp. 235–240, pls. 12–20), from the Philippine Islands and adjacent regions as well as those cited from the Orient by Oyama (1943, pp. 1–74, pls. 1–14, 12 text figs.).

This species is named for the ship U. S. *Mulberry.* The specific name is derived from the Latin word "morus" meaning mulberry.

Two species of gastropods, *Cidarina cidaris* A. Adams and *Calliostoma platinum* Dall, also obtained by dredging off the coast of California, are illustrated on the plate with the new species of *Lima.*

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4. From "loc. A3210" ("Upper Oligocene, Blakeley formation, Kitsap County, Washington. In shale to east of small anticline, south side of Richs passage. NE. ¼ of NW. ¼ of sec. 9, T. 24N., R. 2E.").

5. From "loc. A3694" ("Upper Oligocene, Upper Twin Rivers formation, Clallam County, Washington. From calcareous concretions in seacliff. Center of SW. ¼ of SW. ¼ of sec. 18, T. 31N., R. 10W.").

6. "From the west coast of Patagonia (245–481 fms.)."

7. As *Lima (Acesta) patagonica,* southern Chile, in 348 fathoms.

8. "Hab. Japan." A subspecies, *Lima (Acesta) goliath yagenensis* Otuka, 1939, has been described from the Miocene of Japan.

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